Vol. 108, No. 1 January 10, 1948

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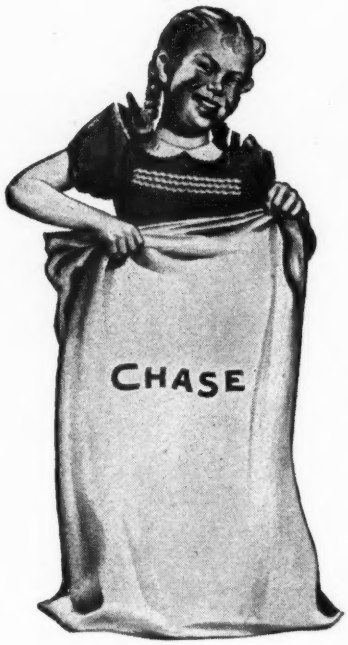

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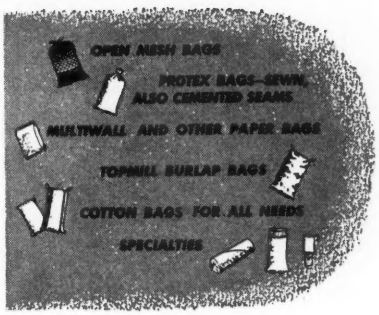

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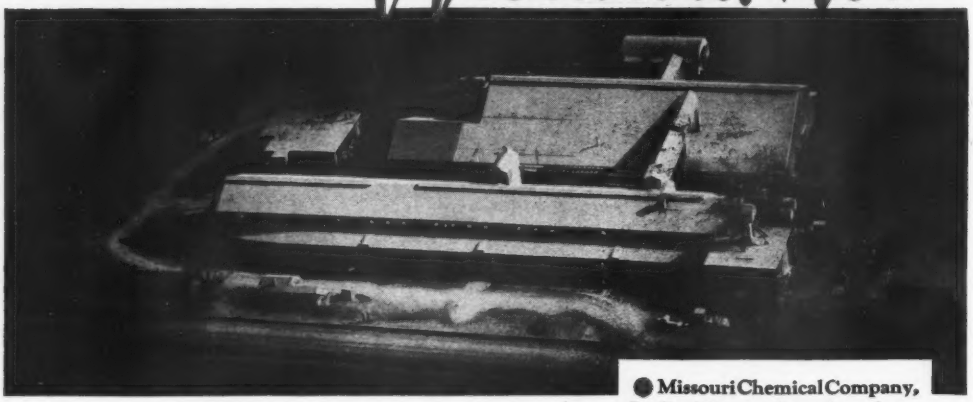

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SPENSOL B	55.0	26.0	18.5	40.8	9.62	31.18
SPENSOL C	66.8	16.6	16.6	37.0	11.65	25.35

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The American FERTILIZER

Vol. 108 JANUARY 10, 1948 No. 1

The Fertilizer Situation for 1947-48

PREPARED BY THE PRODUCTION AND MARKETING ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE

DURING 1947–48 the United States and its possessions will have available more commercial fertilizers than ever before —about double the prewar quantities. Compared with last year there will be about four per cent more nitrogen, five per cent more potash, and six per cent more phosphate. In spite of these increases, however, supplies will not be sufficient to meet all farmers' requirements. Nitrogen will be particularly short of needs and potash continues to be tight. Phosphate supplies are expected to be more nearly adequate.

About 816 thousand tons[1] of commercial nitrogen will be available as fertilizer this year, compared with about 785 thousand tons used last year. Phosphate for fertilizers will total 1,850 thousand tons P_2O_5, compared with 1,745 thousand tons last year. The supply of potash for fertilizers will be about 900 thousand tons K_2O, whereas 854 thousand tons were available last year.

Since the 1946–47 tonnages in each case represented record levels, the quantities expected this year will set new records.

Nitrogen

The United States is the largest producer and the largest importer of nitrogen in the world. Heavy imports have continued to be necessary even though domestic nitrogen production has increased greatly. We now use more than twice as much nitrogenous fertilizer in a year as we did before the war, and more than any other country.

Estimated domestic production of commercial nitrogen for fertilizer this year is 690 thousand tons, compared with 665 thousand tons last year. The highest wartime production of fertilizer nitrogen was 417 thousand tons in 1945; the prewar (1934–38) average production was only 166 thousand tons. The increase of commercial production this year over last will be substantially all in the form of nitrogen solutions. Commercial production of the solid forms of nitrogen is expected to be about the same as last year. Solutions now comprise a little more than one-third of the total commercial output of fertilizer nitrogen in the United States. The nitrogen contained in this form alone for 1947–48 exceeds the combined quantities in all forms of United States manufacture for fertilizer prior to 1941. (See Table I.)

The International Emergency Food Council (now the International Emergency Food Committee of the Council of FAO) which recommends allocations of world supplies of nitrogen fertilizers to the respective countries, has earmarked 187 thousand tons of nitrogen to be imported by the United States. This nitrogen will come chiefly from Chile and Canada, with a small amount from Norway. (See Table II.) The United States is scheduled to export to some 20 countries about 61 thousand tons of commercial nitrogen (57 thousand tons in solid material and four thousand in solutions). Net imports for the United States will therefore be 126 thousand tons, about the same as last year.

Imports scheduled from Canada for 1947–48 will be somewhat smaller than last year, the reduction being principally in calcium cyan-

[1] The word "tons" as used in this report means short tons of 2,000 pounds.

TABLE I.

NITROGEN SUPPLY FOR UNITED STATES AND POSSESSIONS: ESTIMATED QUANTITIES FOR AGRICULTURAL PURPOSES, 1947–48 COMPARED WITH 1945–46 AND 1946–47

	Contained Nitrogen		
Material	1945–46	1946–47	1947–48
U. S. Production:	Tons	Tons	Tons
Ammonium sulphate (Byproduct and synthetic)	149,200	193,700	185,000
Ammonium nitrate (32.5% grade)	137,400	160,500	150,000
Ammonium nitrate compounds (20.5% grade)	19,400	21,500	21,000
Ammonium phosphate	——	10,500	18,000
Sodium nitrate (Byproduct and synthetic)	44,500	29,200	27,000
Urea mixtures	7,800	7,800	7,500
Nitrogen solutions	175,300	212,000	251,000
Organics	30,000	30,000	30,000
Total Domestic Production	563,600	665,200	689,500
Imports:			
Imports:			
Canada	112,200	99,900	83,600
Chile	98,200	85,300	102,000
Norway	——	1,100	1,600
Total Imports	210,400	186,300	187,200
Total Domestic Production and Imports	774,000	851,500	876,700
Exports:	73,000	67,000	61,000
(Scheduled) *Net Supply U. S. and possessions*	701,000	784,500	815,700

TABLE II.

NITROGEN IMPORT PROGRAM OF UNITED STATES AND POSSESSIONS: 1947–48 COMPARED WITH 1946–47, BY COUNTRY OF ORIGIN

Country of origin and material	1946–47 Contained Nitrogen Tons	1947–48 Contained Nitrogen Tons
From Canada:		
Ammonium phosphate 11–48–0	2,400	2,300
Ammonium phosphate 16–20–0	11,000	12,300
Ammonium sulphate	19,700	20,300
Ammonium nitrate	36,800	33,100
Calcium cyanamid	30,000	15,600
Total Canadian	99,900	83,600
From Chile:		
Sodium nitrate	85,300	102,000
From Norway:		
Calcium nitrate	1,100	1,600
Total imports	186,300	187,200

amid. Imports from Chile, on the other hand, will be approximately 20 per cent larger. About 637 thousand tons of nitrate of soda are expected this year, compared with 533 thousand tons received in 1946–47. Also, importers have advised that scheduled imports will be delivered on a more timely basis: 200 thousand tons of nitrate of soda are promised by December 31, 1947, compared with only 100 thousand tons on the corresponding date a year ago.

The aggregate supply of nitrogen available for use as plant food in the United States and possessions will be the domestic production of 690 thousand tons plus *net* imports of 126 thousand tons, or a total of 816 thousand tons of nitrogen.

No part of the above-mentioned supplies of commercial nitrogen is going to the Army for occupied areas abroad. All the nitrogen shipped from the United States to those areas is being produced by the Army in Govern ment-owned plants.

Phosphates

The expected phosphate supply of 1,850 thousand tons P_2O_5 for fertilizer this year will be the largest quantity ever available to United States agriculture. This is an increase of 105 thousand tons P_2O_5, or about six per cent over last year. Most of the increase will come from the production of normal superphosphate. Production of concentrated superphosphate and wet base goods will be only slightly larger than production last year. Exports and imports of phosphates are small.

Potash

The supply of potash for United States agriculture in 1947–48 is expected to be about 900 thousand tons of K_2O. This is an increase of about five per cent over last year. At the same time it will be the smallest annual increase in potash supplies since 1943–44.

Of the 900 thousand tons of K_20 expected to be available, 865 thousand tons will be produced from mineral deposits and lake brines in the United States, about 15 thousand tons or a little more will be imported from Europe, and the balance will come from other potash sources in the United States.

The capacity for potash production in Europe is very large, especially in eastern Germany. Free movement of this potash in commerce would enable the needs of the United States to be met in full.

United States Consumption

During the period from July 1, 1947, through June 30, 1948, the consumption of processed fertilizer in the United States, in-

(Continued on page 28)

Growing Importance of Secondary and Minor Elements and the Need for Their Control

By FIRMAN E. BEAR
New Jersey Agricultural Experiment Station, New Brunswick, N. J.

The primary concern of the fertilizer industry has been that of supplying N, P, and K in available form for the purpose of increasing the acre yields of crop plants. But considerable amounts of Ca, S, Cl, and Na have also been applied to the land as necessary carriers of the N, P, and K. In addition, most fertilizer materials have contained small amounts of such elements as Mg and B in the form of impurities. More recently it has become common practice to make supplemental use of salts supplying Mn, Zn, and Cu for correcting deficiencies in these elements. For the purposes of this paper, the carrier group of accessory elements will be labeled "secondary elements" and the others "minor elements."

All of these elements have been shown to have value for increasing crop yields. This does not mean that all soils tend to be deficient in all of them or that all crops necessarily require all of them. The evidence shows, however, that many soils contain only very limited amounts of one or more of them. It also shows that each of them has value for growing at least several important crop plants. In other words, each of these elements has been applied to more than one soil to the advantage of more than one crop.

Guaranties of Minor Elements

Since all of these elements have value for crop-production purposes and, therefore, could be claimed as fertilizer constituents, it becomes necessary to consider them in relation to the problem of fertilizer control. The case is clearest for the minor elements. If a soil is deficient in boron, for example, this element must be supplied in readily available form, either as a material or as part of a mixed fertilizer. In either case it is desirable that the manufacturer make a guarantee concerning it. This guarantee must show the quantity or percentage of B and its solubility in some agreed-upon solvent. The essential point is that the user of the product be provided with dependable information as to how much B the fertilizer contains and the extent to which this B is available for crop use.

It happens that most of the B of commerce is in the form of borax, a compound that is readily soluble in water. But B can also be obtained in the form of the relatively insoluble ulexite or colemanite. It can also be supplied as a borosilicate glass, in any degree of solubility desired. Such glass is now available as a by-product and much larger amounts of it could be supplied if the demand justified. Very good arguments could be developed in favor of these less soluble forms of B. Since there is a possible choice of B materials, it becomes necessary to make the guarantee in terms of a standard laboratory method of procedure for determining the solubility of this element.

All of the minor elements listed earlier in this paper are now being applied to soils in the form of one or another of their salts. In some cases the salts are being applied as a spray. In guaranteeing the amount of the element, an agreement must be reached as to whether the percentages are to be expressed in terms of the elements, like N; in terms of the oxides, like P_2O_5 and K_2O; or in terms of some standard salt, such as borax.

It is important to keep in mind that additions may be made to the present list of minor elements. Thus Mo is known to be of value to some plants, and it is believed that, in due time, small amounts of a considerable number of other elements may be found to be essential. This raises a question as to what minor elements a manufacturer should be permitted to claim in this guarantee as of today, and as to what the procedure would be in obtaining permission for guaranteeing others. It might well be argued that, as long as the manufacturer made his fertilizer conform to his guarantee, he should be permitted to give the facts concerning any element that might be contained in it.

On this basis, however, one is immediately

(Continued on page 20)

*An address before the First Annual Convention of the Association of American Fertilizer Control Officials at the Shoreham Hotel, Washington, D. C., on October 21, 1947

Phosphate Rock In First Half of 1947

Total mine production of phosphate rock in the United States in the first half of 1947, according to reports of producers to the Bureau of Mines, United States Department of the Interior, was 4,667,220 long tons. Phosphate rock sold or used in the first half of 1947, (4,638,158) long tons, was more than a million tons greater than in the corresponding period of 1946; the value, $23,986,736, was over ten million dollars greater. The average value of the phosphate rock sold or used increased nearly a dollar per ton, from $4.24 in the first half of 1946 to $5.17 in the similar period of 1947, increases being reported in all classes of rock except soft rock from Florida. Total stocks reported in producers' hands on June 30, 1947, were considerably larger than at the end of the first six months of 1946.

In the first half of 1947, phosphate rock was mined in Florida, Tennessee, Idaho, and Montana, and apatite in Virginia. Florida was the leading shipper, as usual, its marketed production increasing to more than four times that of its nearest competitor, Tennessee. Shipments of Florida land pebble and soft rock increased, but there was a considerable decline in the shipments of the Florida hard rock phosphate. The average value of the shipments of soft rock was the same as in the corresponding period of 1946, but there were marked increases in the average values of the shipments of land pebble and hard rock. The total values of the shipments of land pebble and soft rock increased; that of hard rock decreased.

The quantity of Tennessee rock sold or used in the first half of 1947 was greater than in the corresponding period of 1946, and the value was more than half a million dollars greater.

Idaho showed a tremendous increase in the quantity of phosphate rock sold or used in the first six months of 1947 over the January-to-June period of 1947, jumping from 109,658 long tons in the first half year of 1946 to 619,926 tons in the same period of 1947. The average value increased from $5.42 to $5.84, and the total value was over six times as great as in the first six months of 1946.

Montana shipments in the first six months of 1947 were considerably larger than those of the corresponding period of 1946, reaching 106,185 long tons with a total value of $687,085, and an average value of $6.47.

SALIENT STATISTICS OF THE PHOSPHATE-ROCK INDUSTRY IN THE UNITED STATES, JANUARY-JUNE 1946 AND 1947

	1946 Long tons		1947 Long tons	
	Phosphate rock	P_2O_5 content	Phosphate rock	P_2O_5 content
Production (mined)	3,283,179	1,066,615	4,667,220	1,502,994
Sold or used by producers:				
Florida:				
Land pebble	2,246,595	754,783	3,034,064	1,012,885
Soft rock	49,025	10,229	57,168	11.722
Hard rock	55,432	20,182	40,130	14,620
Total Florida	2,351,052	785,194	3,131,362	1,039,227
Tennessee[1]	[2]726,149	[2]210,552	780,685	222,930
Idaho	109,658	34,424	619,926	192,995
Montana	84,241	27,250	106,185	33,256
Virginia	(2)	(2)	—	—
Total, United States	3,271,100	1,057,420	4,638,158	1,488,408
Stocks in producers' hands, June 30:				
Florida	503,000	169,000	681,000	224,000
Tennessee[1] [2] [3]	331,000	91,000	355,000	100,000
Other	19,000	6,000	30,000	9,000
Total stocks[3]	853,000	266,000	1,066,000	333,000

[1] Includes brown-rock matrix of sinter grade and sintered brown rock.
[2] Virginia included with Tennessee.
[3] Does not include plant stocks of washer-grade matrix.

Fertilizer in South Carolina Agriculture*

By DR. GILBEART H. COLLINGS

Professor of Agronomy and Soils, Clemson College, Clemson, S. C.

The subject of commercial fertilizer is foremost in the minds of all of us assembled here. Many of us have the feeling, and we may not be very far wrong, that the consumption of commercial fertilizers in South Carolina largely determines the agricultural well-being of the State. Outsiders from the more favored agricultural States may not be so sure of this. In fact, they may at first thought violently disagree with us. One successful mid-western farmer I know made this remark after traveling over the State of South Carolina, "If the farm economy as I have seen it in South Carolina is representative of a commercial fertilizer consuming territory, then I hope my State of Illinois will never adopt the practice." My answer to this was, "Brother, I would certainly have hated for you to have seen the State, if we had never adopted the practice of applying commercial fertilizers." And what would have been our corp yields today, had the practice never been adopted? Well, it would be somewhat of a guess on my part, but I doubt whether our cotton yields would have been over 100 pounds of lint an acre, and our corn yields over 10 bushels of grain per acre, and the yields of our other crops probably would have been of like dimensions.

Like any other land area of the earth's surface, South Carolina has its advantages and its disadvantages as an agricultural region. Successful farming in South Carolina, as in any other agricultural State, would demand the exploitation of the State's climate and soil advantages and the correcting or minimizing, as far as possible, of their deficiencies. Why not let's put our cards on the table and see what we have here in South Carolina? All of us want a better and a more prosperous agriculture in the State. In addition, many of our number desire a greater sale of commercial fertilizers. These desires are not incompatible and I see no reason why both goods cannot be obtained. Now, let us look at the facts.

The State of South Carolina at least approaches, if it is not in fact, a subtropical land. Its winters are short and crops may be grown 12 months of the year.

The total rainfall in South Carolina is excellent—no, I did not say ideal—but excellent: 45 inches at Columbia, 50 inches in the Northeastern part of the State, and 55 or more inches here at Clemson in the Northwestern part of the State. Although an acceptable yield of most summer grown crops actually utilizes only five to 10 acre-inches of water, it so happens that our crops do suffer at some time during every growing season because of a lack of water. The distribution of our rainfall is not ideal and the water absorptive capacity or retaining ability of our soils is such that, many a year, you have seen and I have seen crop yields in many localities determined largely by available water rather than by the supply of plant nutrients. Because this situation is so constant, occurring year after year, the farmer's resulting loss is so great that it can be only a question of time until irrigation of field crops in South Carolina will be an established custom. Surely the bold streams of the Piedmont and the swamps of the Low County will be made to give up their life-giving waters and to contribute to the establishment and maintenance of a more profitable system of farming in the State. While it is not as yet an extensive common practice to irrigate, it should be, and I predict it will be the common practice in the lifetime of some of us who are present here today. When this is done, we will have in South Carolina better pastures, and higher yields of corn, cover crops, and cotton will result—a more balanced farm income will naturally follow. And what many of you are primarily interested in, the financial returns from the application of commercial fertilizers will be higher and the number of satisfied fertilizer consumers will be increased.

Although South Carolina has a long growing season, this does not mean that the State can grow successfully all crops that can be produced in areas farther north, although this is a popular misconception held by many laymen. Many field crops of the North, like timothy and red clover, do not tolerate our

*Talk delivered before the South Carolina Fertilizer Conference, July 15, 1947

(Continued on page 24)

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McVickar Appointed Chief Agronomist of N. F. A.

Dr. Malcolm H. McVickar, Agronomist at the Virginia Agricultural Experiment Station, Blacksburg, has been appointed Chief Agronomist of the National Fertilizer Association, according to an announcement by President Maurice H. Lockwood. Dr. McVickar, who succeeds the late H. R. Smalley, will assume his duties February 1st.

One of the younger group of enterprising soil scientists, Dr. McVickar comes from an

Malcolm H. McVicar

Illinois farm family, long identified with agriculture. As an undergraduate at the University of Illinois, his primary attention was given to animal husbandry and agronomy; at Ohio State University, where he was awarded his doctor's degree in 1939, his major interest was in soil testing.

For two years following his studies at Ohio State, Dr. McVickar organized and directed an agronomic publicity program for producers of Ohio Certified Seeds. After a brief period with the Farm Security Administration in Oiho, he became Assistant Agronomist,

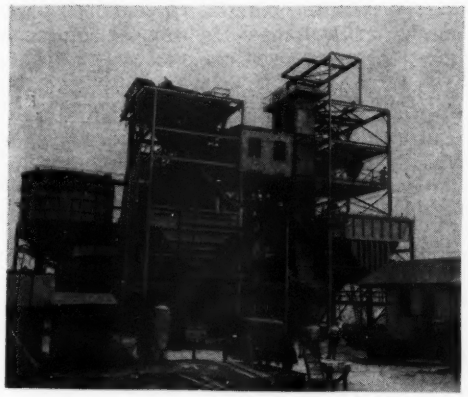
Virginia Agricultural Experiment Station, supervising the agronomic field work, both at Blacksburg and at the outlying field stations. On the basis of his research at the Virginia Station, he has produced more than 20 bulletins and scientific articles; he is also a frequent contributor to the farm press.

Dr. McVickar has been active in agricultural experiment work. Through his efforts and those of his co-workers, 90 bushels of corn were produced on an old worn-out broomsedge infested field in 1946—the result of proper fertilization and other sound cultural practices.

Well-known in fertilizer and agricultural circles, Dr. McVickar is a member of the American Society of Agronomy, Soil Science Society of America, Virginia Academy of Science, and other scientific groups, as well as the Rotary Club.

New Swift Phosphate Rock Plant Completed

With the completion of the new washer and flotation plant, the new phosphate rock mine of Swift & Co. Plant Food Division, near Ft. Meade, Fla., is now ready to go into production, according to an announcement by C. T. Prindeville, vice-president. This new construction, which has been under way for two years, will mean a 50 per cent increase in the company's phosphate rock production.



New Swift Washer and Flotation Plant

"The fertilizer industry," Mr. Prindeville said, "is now producing more than twice the average amount of plant food that was used in the five years preceding the war. Despite this production increase, demands have been even greater. However, Swift & Company and other industry members are continuing to do all they can to meet these increased demands."

The new Swift phosphate plant near Ft. Meade is the company's second mine now operating in the Florida phosphate field.

Phosphate rock in Florida is mined by stripping off the layer of soil over the phosphate deposit. Huge draglines remove the phosphate matrix, which is then pumped hydraulically to the washer. Coarse particles of phosphate rock are separated from the clay and sand in the washer, then are dried preparatory to grinding. The fine particles remaining in the water, consisting of phosphate and sand, go to the flotation unit, where they are separated. Thus a large quantity of valuable phosphate, formerly wasted with the wash water, is now recovered.

October Superphosphate

During the month of October, production of all kinds of superphosphate (figured on the basis of 18 per cent A. P. A.) totaled 890,888 tons, as compared with 808,503 tons in September and 754,215 tons in October 1946, according to the figures of the U. S. Bureau of Census.

Normal superphosphate output of 791,625 tons was the largest for any October on record and only 12,000 tons less than the all-time high for a month's output which was achieved last May. Stocks on hand at the end of October came to 684,631 tons.

Concentrated superphosphate established a record for a month's output with 37,994 tons reported. This is an increase of over 30 per cent on the October, 1946 production. Shipments were about the same as production, leaving stocks on hand of 63,233 tons.

Production	Normal 18% A. P. A Tons	Concentrated 45% A. P. A. Tons	Wet-Base Goods 18% A. P. A. Tons
October, 1947	791,625	37,944	4,403
September, 1947	727,852	29,911	5,873
October, 1946	677,027	29,072	4,508
Shipments and used in Producing Plants			
October, 1947	796,366	37,842	3,334
September, 1947	769,973	27,766	1,317
October, 1946	728,635	30,141	2,097
Stocks on Hand			
October 31, 1947	684,631	63,233	15,225
September 30, 1947	676,879	62,584	14,156
October 31, 1946	537,542	47,908	10,600

Middle West Committee to Hold Soil Improvement Meeting

The Middle West Soil Improvement Committee is sponsoring a one-day joint meeting of agronomists and soils men of the middle west area with the fertilizer industry on Thursday, February 26, 1948, at the Palmer House, Chicago, Illinois.

The meeting is open to all interested members of the fertilizer and related industries.

College men from thirteen states have been invited to review their recent research work on soil fertility. The discussion will center around the general theme, "Factors Affecting the Efficient Use of Fertilizers." The morning session will be devoted to review of experimental work. A question and answer discussion is scheduled for the afternoon session with a panel of agronomists heading the discussion.

More Eastern Ammonium Nitrate to Be Exported

Because recent power shortages on the West Coast have resulted in losses of anticipated ammonium nitrate production, 3,000 tons of which were destined for export under the world-wide distribution recommended last spring by the International Emergency Food Council, the Office of Materials Distribution has asked producers in other areas to supply this export amount.

Under the OMD fertilizer export program announced last July, 16 per cent of their 1946–47 production of ammonium nitrate was the maximum for which producers were required to accept export orders during the 1947–48 fertilizer year. The changes announced raise this ceiling only slightly, to approximately 16.6 per cent of base period output. The action does not increase the total export quota set last Spring, but merely rearranges the sources of supply without seriously burdening them, OMD pointed out. Shipments are to be spread over a three-month period in order to minimize interference with domestic orders.

Ammonium nitrate producers affected by the changes are Tennessee Valley Authority, whose output is distributed by Associated Cooperatives, Inc., Sheffield, Ala.; the Lion Oil Company, El Dorado, Ark., and the Spencer Chemical Company, Kansas City, Mo. These companies have been notified by letter of their individual shares of the 3,000 tons to be added to the amount of ammonium nitrate they were expected to export under the 1947–48 program. OMD officials said this redistribution was made after consultation with producers concerned, at a meeting at which it was also proposed that all exports be scheduled in such a manner that a sizeable proportion of any company's monthly output would be available for domestic delivery.

Bemis Distributes Presidential Election Folders

With election year in the offing Bemis Bro. Bag Co. is again distributing its Presidential Elections Folder—a record of electoral votes by state and party from 1860 to the present. Printed in three colors, the folders contain a color-coded chart which shows at a glance the elected and defeated presidential candidates starting with Lincoln, the party affiliation, the number of electoral votes from each state and how these votes were cast.

The period covered by the Presidential Election information in this folder approximates the history of Bemis Bro. Bag Co., which was established in 1858. Copies of this handy reference may be obtained by writing to the nearest Bemis Bro. Bag Co. office.

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FERTILIZER MATERIALS MARKET

NEW YORK

Organics Market Dominated by Feed Trade. Potash Producers Find Transportation Improved. No Further Imports of European Potash Reported. Sulphate of Ammonia Prices Increase. Eastern Superphosphate Position Improved

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, January 7, 1948.

Organics

The feed trade continued to out-bid the fertilizer people for available supplies of tankage and blood and the market was pretty well cleaned up for nearby shipment. Last sales of tankage and blood were made at $10.00 to $10.50 per unit of ammonia ($12.15 to $12.76 per unit N), f.o.b. shipping points. The demand from the fertilizer trade was very small on account of present asking prices. Vegetable meals for quick shipment were hard to obtain and some mills were sold ahead for a considerable period. Linseed meal was especially scarce for quick shipment and cottonseed meal was offered at $100.00 per ton, f.o.b. southern points and soybean meal at $95.00 per ton, f.o.b. Decatur, Ill. Hoof meal was offered at $9.00 per unit of ammonia ($10.94 per unit N). The small amount of low grade organics that were offered brought high prices and buyers seemed glad to obtain them.

Fish Meal

Some material was reported sold to the feed trade at $175.00 per ton, f.o.b. shipping point. Supplies of this material are very low because very little new material is being obtained.

Castor Pomace

The demand continued good for this material and producers were busy filling old contracts. No additional material was offered.

Potash

Most fertilizer manufacturers still report they are short of their requirements but producers are doing their utmost to fill their needs as quickly as possible and report a better movement of empty freight cars. No additional reports were heard of any more foreign material coming in either from French or German sources.

Superphosphate

Producers report they are in a good position to take care of domestic demands, particularly in the East. However, this situation is expected to change as soon as the heavy shipping season gets under way. Triple superphosphate is still far short of the demand.

Sulphate of Ammonia

It has been confirmed that a number of plants have increased their price to $40.00 per ton, f.o.b. ovens, effective January 1st. Still other producers are raising their prices, effective February 1st. The new range in price will be from $35.00 to $40.00 per ton, f.o.b. shipping points.

Nitrate of Soda

Importers report regular arrivals of this material continue at most ports. The demand is still far in excess of the supply.

Bone Meal

Some producers are sold ahead for 60 days and very little material is being offered. Market is in a strong position.

Nitrogenous Tankage

A small amount of foreign nitrogenous was offered but the price was much higher than the domestic market. Domestic producers continue sold ahead.

Ammonium Nitrate

Export shipments continue on nitrate of ammonia and outlook for domestic trade to get any additional supplies looks rather poor at the moment. Materials for spring top dressing will be short, based on best information on hand at the present time.

PHILADELPHIA

Fertilizer Material Demand Continues Strong but Farmers Slow in Placing Orders. Material Transportation Improves.

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, January 5, 1948.

Most of the chemical fertilizer materials are still in short supply, and the demand continues strong. Farmers are still slow in ordering out their mixtures. Shipments of most of the raw materials are on contract and are slightly behind schedule. Trading in general shows the normal quietness for this season of the year.

Sulphate of Ammonia.—Supply is unusually tight and, due to excessive demand and limited car supply, a stronger market is looked for. Price range is from $35.00 to $40.00 per ton in bulk, f.o.b. ovens.

Nitrate of Soda.—The market is firm and demand is in excess of presently available stocks.

Ammonium Nitrate.—Requirements are far in excess of production and supply.

Castor Pomace.—No new business is offered and any shipments are on standing contracts.

Blood, Tankage, Bone.—Any demand is almost entirely from feeding trade, with the market rather dull. Prices suggested run $10.00 to $10.75 ($12.15 to $13.07 per unit N), for blood, and $10.00 to $10.50 ($12.15 to $12.76 per unit N) for tankage. Some tankage was sold at $10.00 ($12.15 per unit N). Bone is in very scant supply and mostly under contract.

Fish Scrap.—Offerings are very scarce and market is firm at previous high prices.

Phosphate Rock.—Shipments are moving steadily and this activity precludes any accumulation of stocks. The car supply situation has been somewhat improved, and the production is practically all under contract.

Superphosphate.—Stocks continue in short supply and the demand is generally very heavy.

Potash.—Demand continues very much in excess of production capacity and anticipated arrivals from Europe will not go very far toward satisfying requirements.

CHARLESTON

Shortage of All Materials Continues. Box Car Situation Improving. Sulphate of Ammonia Prices Advance. Organics Prices High.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, January 5, 1948.

Sales of tax tags in November were the highest on record for 16 states which indicates a heavy movement of mixed goods to the farmers. All mineral fertilizer materials continue short of the demand as manufacturers strive to produce enough mixed fertilizers to meet the call from farmers.

Organics.—Demand for organics continues light from the fertilizer trade, but the market on blood and tankage from the feed trade is fairly strong. South American organics continue priced out of the market. Domestic nitrogenous remains at around $6.50 per unit of ammonia ($7.90 per unit N), in bulk, f.o.b. midwestern production point.

Castor Pomace.—There are no additional offerings of castor pomace and shipments are confined to contract buyers.

Potash.—No easement in the demand for fertilizer purposes can be noticed as all fertilizer manufacturers apparently are short of their expected needs. Producers continue to liquidate accumulated stocks and with the easement, slightly, of the tight situation on box cars, it is still a gradual process of decreasing the stocks at the mines.

Nitrate of Soda.—Demand continues to exceed available supply although the imported

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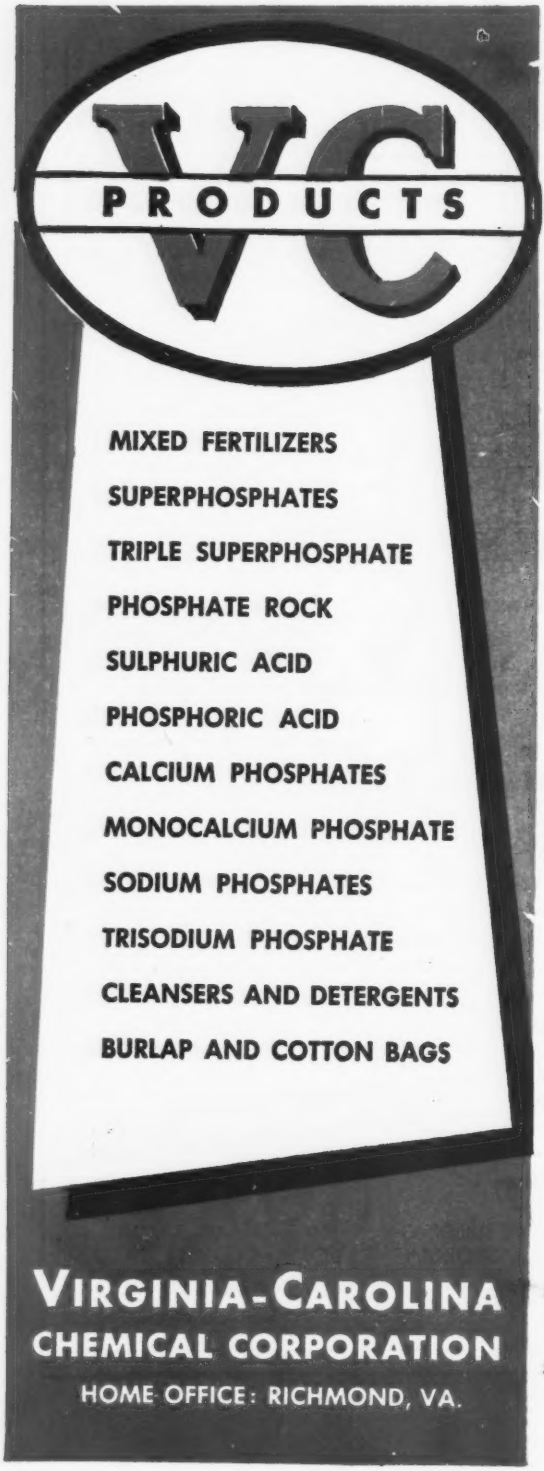

nitrate of soda is fairly well on schedule. Importations on Chilean nitrate of soda are reported at 637,000 tons for 1947/48 against 533,300 tons in 1946/47. Domestic production continues hampered by shortage of raw materials. The price on Chilean nitrate of soda is now $48.00 per ton in bags at the ports.

Sulphate of Ammonia.—It is expected that around February 1st there will be a greater range in prices. Prices have been running $35.00 to $40.00 per ton in bulk at the ovens. Demand continues exceedingly strong with little prospect of the supply staisfying everyone during 1948.

Dried Ground Blood.—The market position continues firm with stocks limited. Prime interest is from the feed trade with practically no interest from the fertilizer trade at the present levels of price at around $10.75 per unit of ammonia ($13.07 per unit N), f.o.b. midwestern point in bulk.

Tankage.—The New York and Chicago prices are around $10.50 to $10.75 ($12.76 to $13.07 per unit N), with the market rather quiet.

Superphosphate.—Stocks continue short practically throughout the country. Demand from the midwest is particularly strong and, in spite of heavy production this year, supply is not expected to take care of this demand.

Phosphate Rock.—Movement is very heavy to the limit of availability of box cars. The box car situation has improved gradually, but contract commitments hold the market tight. Some acidulators complain of inability to get their entire wants.

November Sulphate of Ammonia

The figures of the U. S. Bureau of Mines show that production of by-product sulphate of ammonia during November continued at top levels. Production totaled 71,998 tons, a drop of 2.4 per cent from the October output

	Sulphate Ammonia Tons	Ammonia Liquor Tons NH_3
Production		
November, 1947	71,998	2,098
October, 1947	73,741	2,188
November, 1946	59,293	2,437
Jan.-Nov., 1947	746,082	23,496
Jan.-Nov., 1946	586,636	22,778
Shipments		
November, 1947	69,877	1,913
October, 1947	69,153	1,916
November, 1946	69,251	2,121
Stocks on hand		
November 30, 1947	32,241	783
October 31, 1947	31,104	757
November 30, 1946	35,389	805

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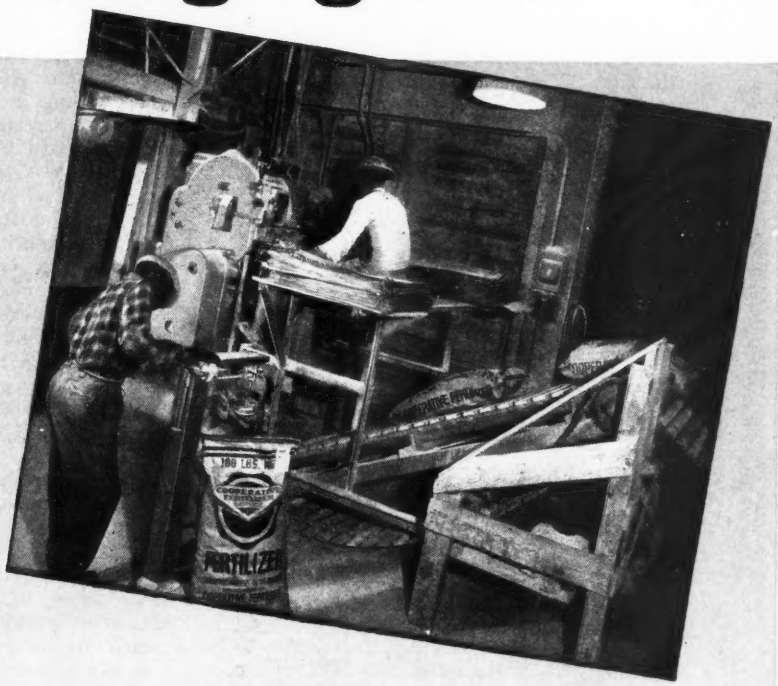

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of 73,741 tons, which is accounted for by the one less working day during November. For the first 11 months of the year, production amounted to 746,082 tons, an increase of 27 per cent over the same portion of 1946. Shipments during November were about equal to production, leaving stocks on hand at producers plants of 32,241 tons.

SECONDARY AND MINOR ELEMENTS

(Continued from page 9)

faced with the problem of a possible guarantee of the amount of calcium in a fertilizer material or mixture. Should the manufacturer of superphosphate, for example, be permitted to guarantee the Ca content of this product? In this case, consideration must be given to the fact that, although Ca is an essential element in plants, the greatest need, in acid-soil areas, is for an alkaline form of it. Nevertheless $CaSo_4$ is used as a fertilizer for peanuts. It is also being applied in ever-increasing tonnages as a corrective for alkali in arid regions and as an agent to improve the drainage of certain types of ponded areas in humid regions. If the manufacturer is to be permitted to give a guarantee of the Ca content of this product, it would seem necessary to indicate the form in which it was present.

In regions that are far removed from industrial areas, it may be necessary to apply some form of sulphur as a fertilizer. This is the only one of the mineral nutrients that is likely to be applied in the elemental form. This provides a special excuse for having the guarantee expressed in terms of the element. In most cases, however, the S could be applied to better advantage as a regular constituent of superphosphate or of ammonium sulphate.

Sodium presents another case that merits special consideration. It is known that this element has value in crop production. In some cases it appears to serve directly as a plant nutrient, the members of the beet family being notable for their high content of Na. In other cases Na apparently has value as a partial substitute for K. It is conceivable, therefore, that producers of $NaNO_3$, NaCl, and Na_2SO_4 might desire to sell their products as sources of Na for use on the land. Since Na would be a possible competitor of K, it would appear logical to have it guaranteed in terms of Na_2O. The logic of this is more apparent than real, however, since 100 pounds Na_2O could be credited with a substitutive value equivalent to 152 pounds of K_2O.

The case for chlorine presents another type of problem in that the guarantees for this element have usually been made in terms of its maximum rather than its minimum percentage. It has been found the KCl is usually more effective than K_2SO_4 or KNO_3 in increasing crop yields. In terms of the quality of certain crops, however, it is desirable that the Cl content be limited. Thus it is generally agreed that the Cl content of fertilizers for the finer grades of smoking tobacco should not exceed 2 per cent.

In this connection it should be noted that the effects of Cl on yield may be indirect rather than direct. For example, it has been found that plants with a high Cl content suffer less during periods of drouth than those in which the Cl has been replaced by SO_4. The special point of difference between this element and some of the others is that the guarantee must be for its maximum percentage.

A third group of elements that must be considered includes those that are known to be of greater importance to animals and man than to plants. Two notable examples are iodine and cobalt. In such cases the question arises as to whether or not these elements should be fed directly to animals by way of their salt. Livestock men offer little opposition to this procedure, but human nutritionists appear to favor having these elements become a part of the plant before they are consumed

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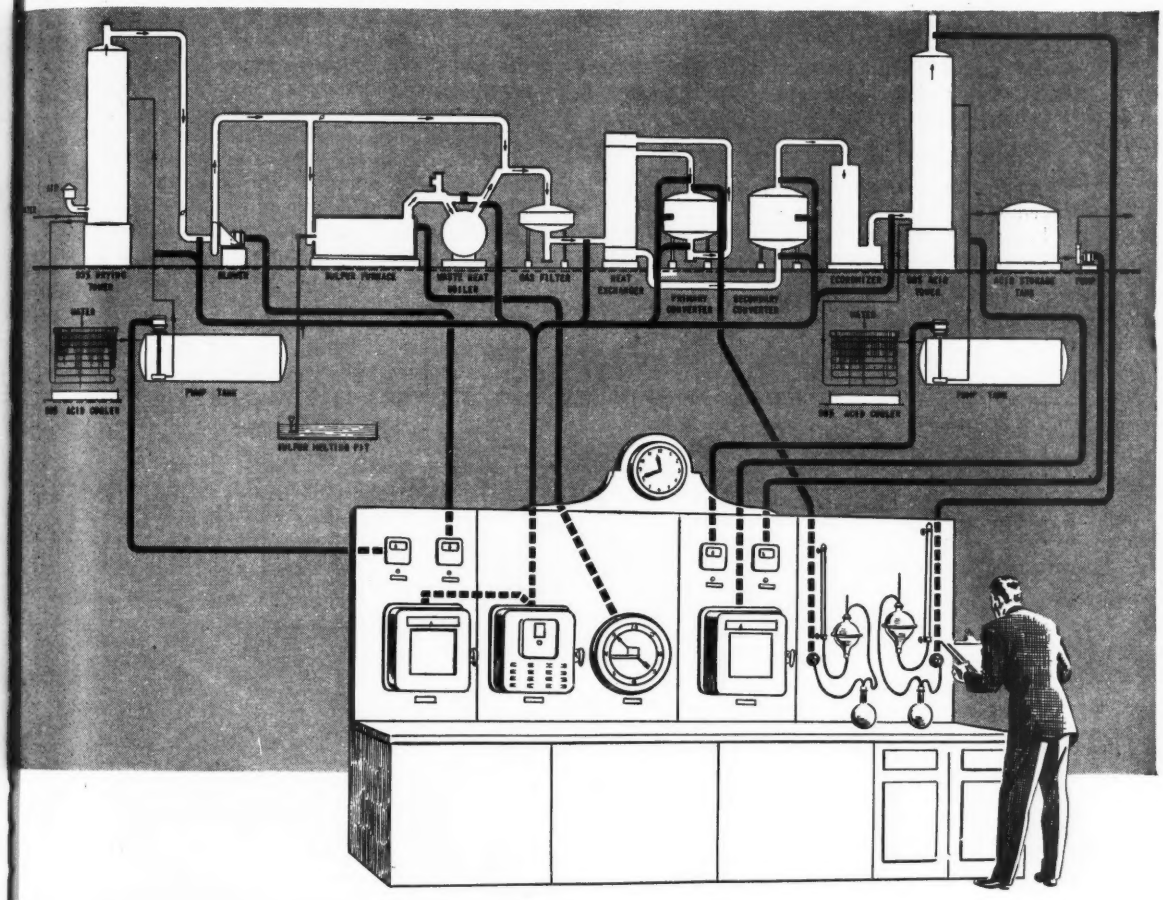

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by man. It is to be expected that some farmers will also prefer the soil-plant route to their livestock, and they are quite likely to be encouraged in this by the fertilizer manufacturer. Assuming that the manufacturer desires to do so, should he be permitted to add and guarantee small amounts of I and Co, and such other elements as may later be found to belong to this group?

Si, Al, and Fe

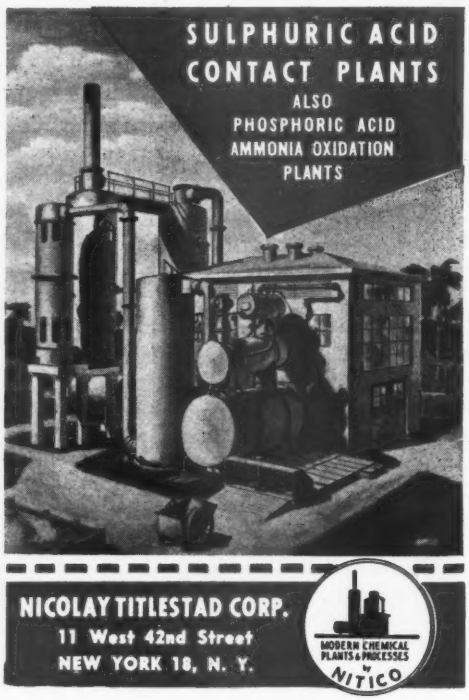
Finally, it must be remembered that all crude fertilizer materials contain Si, Al and, Fe, sometimes in considerable percentages. Each of these elements has been applied to soils to good effect. Soluble Si appears to be of value *per se* for some plants and to have a partial substitutive value for P in others. It also effects a release of fixed P. Al is believed to have more of a negative than positive value to most plants, yet aluminum sulphate is applied to good effect on soils on which such plants as azaleas, rhododendrons, and mountain laurel are being grown. Most soils contain an abundance of Fe, yet iron sulfate is being regularly applied to pineapple plants growing on certain highly manganiferous soils in the Hawaiian Islands.

Some fertilizer manufacturer might want to guarantee the Si, Al, or Fe content of some special brand of fertilizer. If this were permitted, then it would seem illogical to object to the inclusion in the guarantee of any element that might be contained in the fertilizer, assuming that a certain degree of usefulness of the element could be demonstrated. It must be kept in mind that many of the raw products from which fertilizers are made contain small amounts of a considerable number and variety of elements that have received little consideration either by soil chemists or plant physiologists or by the fertilizer industry.

The preceeding comments present an overall picture of the problems that are involved in adding to the older N–P–K guarantees those of other elements that appear necessary if the manufacturer is to meet the current needs of fertilizer users. It would seem that consideration must be given not only to the preparation of a list of elements for which guarantees may be made, but the least amount of each for which credit may be claimed. The allowable minima for those minor elements that have value only to the consuming animal and not to the plant should be much larger for fertilizers than for feeds, since only a portion of any element that may be applied to the soil can be recovered in the crop producedimmediately after its application.

It seems important to point out that the need for minor elements in the growing of plants and animals is widespread. In proportion as higher acre yields are striven for by the use of larger amounts of N–P–K fertilizers and the planting of improved hybrids, such deficiencies will become more serious. It must be kept in mind, also, that higher yields not only increase the quantity of any given element that is required by the crop but thay also dilute the crop's content of the elements required by the animals that consume them.

As a concluding paragraph, it may be well to point out that much of the popularity of animal manures and composts may have its explanation in the great variety of mineral elements which such materials contain. Animal manures may supply missing minor elements that have been carried many miles from their point of origin by way of grain feeds. The compost pile often contains refuse of plants that have come from the four corners of the earth. When all the facts about such products are known, it should be possible to take the mystery out of manures. Once the guesswork has been resolved, inorganic manures of greatly superior quality can be produced. They will have the advantage that they can be exactly reproduced at will.



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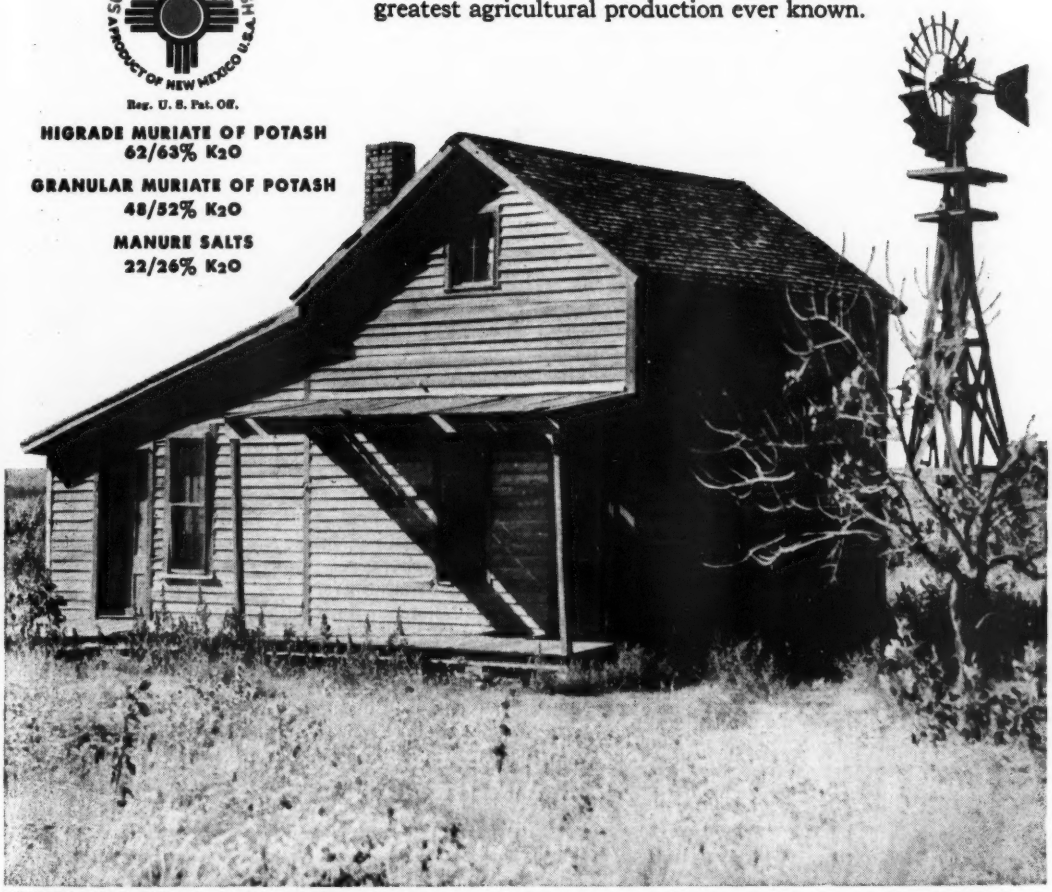

UNITED STATES POTASH COMPANY, *Incorporated,* 30 Rockefeller Plaza, New York 20, N. Y.

FERTILIZER IN SOUTH CAROLINA

(Continued from page 11)

hot weather. It has been suggested that even corn does not prefer our high soil temperatures during the latter part of its growing season. This may explain why we make our best yields of corn on cool bottom lands, or during wet seasons, or from early plantings. And it may be that for this reason our corn yields may never average as high as those of North Carolina and Virginia. The fact, however, that we can grow a variety of crops for 12 months of the year should be capitalized upon by our farmers and, as far as is practical, *every square yard of every farm in this State should have a growing crop on it every day during the year.*

The surface soils of South Carolina are light in texture, and respond beautifully to the plow; that is, taking the soils of the State as a whole, they are well-drained, sandy soils, and sandy soils are easy to cultivate. Of course, the soils of the coastal plain are much lighter than the soils of the Piedmont. What clays we have in general cultivation are largely in the Piedmont. This physical condition of our soils is a distinct advantage that should be more appreciated by our farmers. You fertilizer men also should be immensely interested in this characteristic of the South Carolina soils, for such soils respond beautifully to fertilization.

Organic Matter Needed

The surface soils of South Carolina are also light in color, for their organic matter content is unfortunately low. The high rainfall and temperature to which these soils have been subjected have oxidized or burned out the organic matter so that today they probably do not contain more than about an average of 16,000 pounds of organic matter per acre. This is hardly more than one-tenth of the organic matter found in many soils of more favored agricultural regions, such as the American corn belt.

The tilth of South Carolina soils can be further improved through the addition of more organic matter in the form of barnyard manure and green manuring crops. These practices should be encouraged, for commercial fertilizers will not take their place entirely. We must not forget, however, that the improvement of South Carolina soils in this direction is limited, for the saturation point of South Carolina soils for organic matter is hardly more than twice their present organic matter content. The optimum organic matter content of our soils is probably much higher than their saturation point. Optimum organic matter content in South Carolina soils appears to be an impossibility. The climate of South Carolina has set a limit to the quantity of organic matter our soils can hold. Unfortunately for us, nature has set the pop valve too low. This we should recognize, for this fact alone must alter our approach in South Carolina and in the South to all soil management problems as compared with that followed by our northern neighbors.

Lime Program Important

The acidity of South Carolina soils is much too high for the most profitable production of the crops, other than tobacco, that we attempt to produce. Director Cooper of the South Carolina Agricultural Experiment Station has been ding-donging this idea into the minds of South Carolina farmers for a dozen years or more. These soils are much too acid to allow the proper utilization of the fertilizers you manufacture and sell to the farmer. This is a really serious situation in the State and I think you fertilizer men could afford to and should give the problem more study. *If you are really desirous of seeing to it that the farmers of South Carolina reap the greatest returns from the fertilizers you sell them, you will get behind a lime program in this State, soul and shoulder.* Soil acidity in South Carolina can be whipped —there is probably enough lime in South Carolina to cover every cultivated field many feet deep. There is no excuse for allowing the soil acidity problem to continue to plague our farmers and to hold in check the profits they could otherwise obtain from the use of commercial fertilizers.

The need for commercial fertilizer in the United States first developed, as would naturally be expected, in the older agricultural areas along our Atlantic coast. But once the need became apparent, the expansion in the use of commercial fertilizers made its greatest

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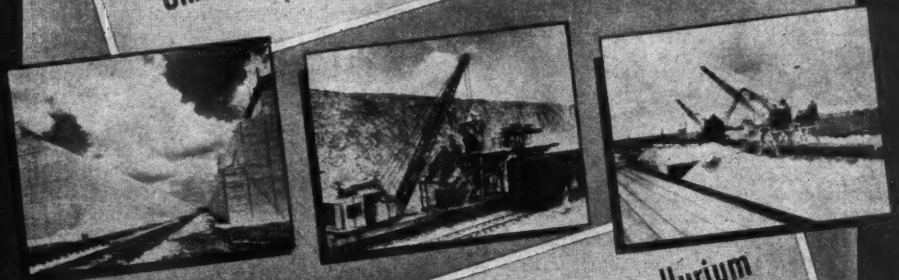

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Mine: Newgulf, Texas

progress in the southeastern States, of which South Carolina is a member. The layman and, I find, some fertilizer men in South Carolina are not aware of the real reason for this. The reason is due largely to two facts: (1) the geographical location of South Carolina in the humid region of the world, and (2) the nature of the clay component of South Carolina soils.

Low Fertility Soils

As I said before, South Carolina is almost a sub-tropical land. Its surface soils are gray in color, low in organic matter, and have been highly leached. The subsoils are largely reds and yellows, showing again that this land has been subjected to high temperatures and rainfall and, because of this, has become highly oxidized and hydrated. Under such a condition it is only natural to expect to find soils of low fertility, a fact that has been observed under similar conditions all over the world. Climate such as we have brings about a relatively rapid breakdown, geologically speaking, of soil minerals and, as a result, great quantities of nutrient elements are thus released through the ages for plant consumption, for soil absorption, or for loss by leaching. Unfortunately, however, these processes also bring about the deterioration of the soil clay minerals. As a result, the clay now found in South Carolina soils is mostly the mineral Kaolinite which in some respects is just about the poorest clay mineral we could desire for nutritional purposes. Kaolinite has (1) a low saturation point for water, that is, a low water-holding capacity, and (2) a low saturation point for fertility, that is, a low base-exchange capacity. So it did not help us very much to have nature release through the ages tremendous quantities of plant nutrients from minerals, since we did not have a clay, or soil bank, to hold it until such time as our farmers of today desired to use it. As a result this fertility was taken away in drainage.

Summary

Summarizing the situation in South Carolina, we must conclude that when South Carolina was first settled our supply, or bank account, of fertility was low but we did not then need fertilizers. However, only two to five generations of continuous farming of many soils in the State have been enough to close out, in the main, the original bank account of nutrients. As this date of nutrient bankruptcy approached, it became necessary to supplement our low reserves with commercial nutrients. Today, regardless of an excellent climate and regardless of possessing soils with a good physical condition, South Carolina crop yields are low because: (1) crops do not get an optimum supply of water every day during their growing season, and (2) crops do not get a sufficient amount of nutrients every day during their growing period. To remedy the first defect it appears that we can do little if it is impractical to irrigate. Suitable commercial fertilizers correctly applied may be the answer to the second defect. What profitable agriculture we have in South Carolina is almost entirely dependent on the use of commercial fertilizers. Furthermore, the chance of greatly building up our soil bank bank account of fertility with commercial fertility is not great—our bank is just too small.

It would appear, then, that our farmers of South Carolina are doomed to continue to apply, in the main, annual and split applications of commercial fertilizers. When we recall that all of our soils are drouthy, due to their Kaolinitic clay content, and that the distribution of our annual rainfall is faulty, we should begin to appreciate the basic factors underlying the fertilizer problems in South Carolina and the part that irrigation and the judicious use of commercial fertilizers might play in any profitable system of farming adopted by the farmers of the State.

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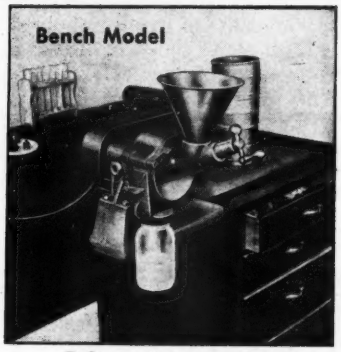

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THE FERTILIZER SITUATION FOR 1947-48

(Continued from page 8)

cluding Hawaii and Puerto Rico, will probably exceed 17 million tons, containing around 3.6 million tons of actual plant food. This will be a record quantity. Mixed fertilizers probably will continue to be somewhat more readily available than straight materials.

The previous record consumption was last year, when about 3.3 million tons of plant food were used in the form of well over 15 million tons of prepared fertilizer. From 1935 to 1939 the yearly average use of fertilizer was slightly less than 1.5 million tons of plant food contained in nearly 7.5 million tons of fertilizer.

The percentage of plant food in prepared fertilizer has been increasing for a number of years and this continued even during the war period. However, the plant food content of the fertilizers distributed to farmers has not increased as rapidly in the last 15 years as the plant food content of the materials from which the fertilizers are made. Further increases in average plant food content could reduce the cost of transporting and handling fertilizer, and thus bring savings in the cost of fertilizers to farmers.

Fertilizer consumption has increased in all parts of the country since records were started in 1900. The most rapid increase has been during and following World War II. Consumption at present is more than double that of prewar. Although the greatest *percentage* increase in the use of fertilizer has been in the Midwestern and Western States, the largest *tonnage* increases have been in the South and Southeast. Undoubtedly consumption in most areas would have increased much more had supplies been available.

Army Fertilizer Program

Nitrogen fertilizer is being produced by the U. S. Army at Government ordnance plants for use by Occupation Authorities. This is being used to bolster agricultural production in the zones of Germany, Japan, and south Korea for which the United States has responsibility. The program is designed to ease the occupation job in these areas without cutting down on commercial supplies of fertilizer available to farmers in the United States.

The output from the Army program is not included in the tables and discussions of commercial supplies in this report. No part of the commercial supply of nitrogen is being taken by the Army.

The Army nitrogen fertilizer program calls for monthly production of 65 thousand tons of ammonium nitrate. On an annual basis this represents approximately 250 thousand tons of nitrogen. This production is based upon three major operations as follows:

(1) The output of three anhydrous ammonia plants: Cactus Ordnance Works at Dumas, Tex.; Morgantown Ordnance Works at Morgantown, W. Va.; and the Ohio River Ordnance Works at West Henderson, Ky.

(2) Four other plants are used for converting the ammonia into ammonium nitrate solution. They are located at Lawrence, Kans.; Joliet, Ill.; Radford, Va.; and Charlestown, Ind.

(3) The final step in making the fertilizer, namely, processing the ammonium nitrate solution into solid ammonium nitrate, is done at five plants located at Grand Island, Nebr.; Burlington, Iowa; Carbondale, Ill.; Fremont, Nebr.; and Apco, Ohio.

Because of the decentralized operation and the excessive amounts of freight involved, the cost of this fertilizer to the Army is far above the prices prevailing for commercial nitrogen.

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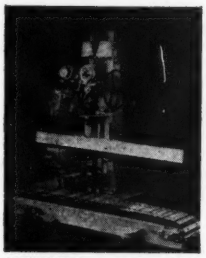

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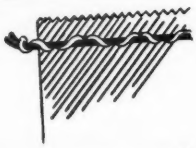

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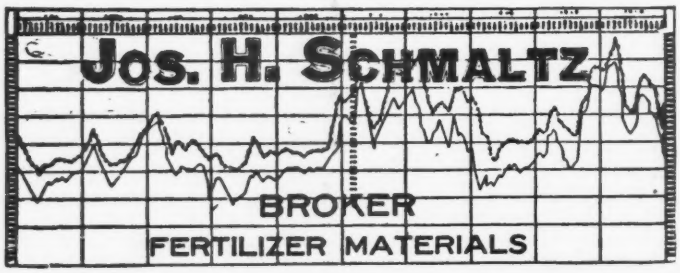

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